

A survey of the *Eupithecia* fauna (Lepidoptera, Geometridae) of the Western Himalayas: Part III

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Abstract In the third and last part of this series, twenty-six further species, including four new species, of *Eupithecia* are documented from Kashmir and adjacent territories of Pakistan and India. A complete list of taxonomic changes proposed in the three parts of the paper is given. The identity of a number of older species names is clarified.

Key words Kashmir (Pakistan/India), Eupitheciini (Lepidoptera, Geometridae), revision, taxonomy, synonymy, distribution, new species, *Eupithecia efferata* Mironov & Ratzel, sp. n., *Eupithecia egregiata* Mironov & Ratzel, sp. n., *Eupithecia brunneomarginata* Mironov & Galsworthy, sp. n., *Eupithecia exicterata* Mironov & Ratzel, sp. n.

Introduction

This is the third part of a three part paper surveying and revising the *Eupithecia* of the Western Himalayas. A full introduction and background was given with the first part (Mironov *et al.*, 2008a). A full list of taxonomic changes introduced with the three parts is given at the end of this part.

Abbreviations. BMNH: The Natural History Museum, London, United Kingdom; MNHU: Museum für Naturkunde, Zentralinstitut der Humboldt-Universität zu Berlin, Germany; ZFMK: Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany; ZSM: Zoologisches Staatssammlung München, Germany; SMNK: Staatliches Museum für Naturkunde, Karlsruhe, Germany; SMNS: Staatliches Museum für Naturkunde, Stuttgart, Germany; TTM: Termeszettudományi Múzeum Allattara (Hungarian Natural History Museum), Budapest, Hungary; NHRS: Naturhistoriska Riksmuseet, Stockholm, Sweden; MHMW: Naturhistorisches Museum Wien, Austria; ZISP: Zoological Institute, Russian Academy of Sciences, Saint Petersburg, Russia; IAET: Institute of Agriculture and Environment, Estonian Agricultural University, Tartu, Estonia; NSMT: National Science Museum, Tokyo, Japan; EIHU: Entomological Institute, Hokkaido University, Sapporo, Japan; ZMKU: Zoological Museum, National Shevchenko University, Kiev, Ukraine; ZMMU: Zoological Museum, Moscow State University, Russia; coll. László: coll. Gyula M. László, Budapest; coll Ratzel: coll. Ulrich Ratzel, Karlsruhe.

Eupithecia propagata Prout, 1926

Eupithecia propagata Prout, 1926, *Mem. Dep. Agric. India* (Ent.) **9** (8): 252.

Eupithecia iracunda Vojnits, 1988, *Acta zool. hung.* **34**: 44, fig. 13; pl. 3, fig. B. **Syn. n.**

Eupithecia beneficiaria Vojnits, 1988, *Acta zool. hung.* **34**: 46, figs 17–19; pl. 3, fig. E. **Syn. n.**

Unavailable names (incorrect subsequent spelling): *beneficiaria*: Vojnits (1988).

Habitus and male and female genitalia were illustrated in Inoue (2000) as *E. iracunda*.

Examined type material. ♂, [India], Kumaon, Muktesar, 7,500 ft., Sept. 1922, Fletcher

coll., *Eupithecia propagata* Prout, type ♂, Brit. Mus. 1927-124, BM Geom. slide no 16418 (holotype, BMNH); 1 ♀, same collection data, BM Geom. slide no 16419 (allotype, BMNH); 1 ♂ 4 ♀, same collection data; 1 ♀, same collection data, but date 12 September; 1 ♀, same collection data, but BM 1939-643 (paratypes, BMNH); ♀, E Nepal, Solukhumbu Sagarmatha, Junbesi, 2,670 m, 10–11. x. 1979, M. Owada, Vojnits slide no 14688 ♀ (holotype of *E. iracunda*, NSMT); ♂, E Nepal, Solukhumbu Sagarmatha, Kharikhola, 1,980 m, 7. x. 1979, M. Owada, Vojnits slide no 14683 (holotype of *E. beneficiaria*, NSMT).

Older material. 1 ♂, Bhimtal to Muktesar, 5–6,000 ft., 11 Sept 1922, Fletcher coll., BM Geom. slide 21524; 1 ♀, Kashmir Valley, 4. viii. 02, 7,000 ft., Coll. Ward BM 1939-1; 1 ♀, Kasauli, Sept 1893, BM 1939-1; 1 ♂, India, Punjab, Khyra Gulley, vii. 1881, H. Roberts coll., BM 1926-395, BM Geom slide 21837; 2 ♂, Narkondah, H. M. McArthur coll., April 1888, Leech coll. 1900-64, BM Geom slide 20837; 1 ♂, India U. P., Naini-Tal, 6,600 ft., 10. ix. 1934, J. A. Graham, BM 1934-648; 2 ♀, Kumaon, Muktesar, Sept. 1922, Fletcher coll. (BMNH); 1 ♀, [India], Kumaon, Muktesar, 7,500 ft., Sept. 1922, Fletcher coll., L. B. Prout Coll., B. M. 1939-643, Herbulot slide no 6114 (coll Herbulot in ZSM).

Eupithecia karnaliensis Inoue, 2000

Eupithecia karnaliensis Inoue, 2000, *Tinea* **16** (Suppl. 1): 34, pl. 165, fig. 21; figs 1299, 1339.

Misidentification: *Eupithecia emikoe* Inoue, 1996, *Trans. lepid. Soc. Japan* **47**: 237 (part paratypes only ♂, ♀).

This species belongs to the *propagata* (= *inepta-sacrosancta*) group and is externally very similar to the Chinese *E. caduca* Vojnits, 1984, but can be distinguished from it by the absence of the small whitish tornal spot on the hind wing. The male genitalia of *E. karnaliensis* very clearly differ from those of *E. caduca* by the broader valve with smaller ventral process, which protrudes from a wrinkled medial depression, and by the presence of one hooked horn-like cornutus on the vesica. The shape of the eighth sternite is similar in both species. The female genitalia of *karnaliensis* are distinguished by the presence of a heavily sclerotized medial blotch in the corpus bursae, the shorter anterior apophyses, the narrower eighth tergite and the smaller, less sclerotized papillae anales which are covered by soft setae, rather than short and stout setae directed towards the eighth tergite, as in *E. caduca*.

Examined type material. ♂, W. Nepal, Karnali, Jumla Distr., Jillya, 2,690 m, 29. ix. 1981, M. Owada, Inoue slide no 14137 ♂ (holotype, NSMT); 1 ♂, NW India, Kashmir, (Kangan-Wayul), Naranag, 2,500 m, Aug. 16–18. 1982, leg. H. Yoshimoto (paratype of *E. emikoe* Inoue, 1996, ZISP); 1 ♀, NW India, Kashmir, Pahalgam-Kolohoi, Liddarwat, 3,000 m, Aug. 8–9. 1982, leg. E. Yoshimoto (paratype of *E. emikoe* Inoue, 1996, ZISP).

Recent material. 2 ♂, Indien, J & K, Ladakh, Kharbu, 2,800 m, 12. vii. 1987, leg. W. Thomas (ZFMK, ZISP); 1 ♂, Indien, J & K, Kashmir, Gund, 2,200 m, 29. vii. 1987, leg. W. Thomas (ZFMK); 2 ♂ 1 ♀, same locality, 14. viii. 1988, leg. W. Thomas (ZFMK, ZISP); 1 ♂ 1 ♀, Pakistan, Great West. Himalaya Mts, near Gabar, 3,200 m, 21–24. viii. 2004, leg. V. Gurko, Ratzel slide no 30805/3w (coll Ratzel); 7 ♂ 4 ♀, Pakistan, Azad Jammu & Kashmir, Thunian, 2,300–2,700 m, 25–30. viii. 2004, leg. V. Gurko, Ratzel slides nos 20505/3w, 21505/3m, 14805/5w, 14805/6m, 30805/1w, 17905/4m (coll. Ratzel).

Eupithecia coccinea Vojnits, 1981 (Fig. 1)

Eupithecia coccinea Vojnits, 1981, *Acta zool. hung.* **27**: 224, figs 8, 9.

A little known species, hitherto recorded only from Nepal.

Examined type material. ♂, Nepal, Prov. Nr. 2 East Jiri, 2,000 m, 12. viii. 1964, leg. W. Dierl, Holotypus *Eupithecia coccinea* Vojnits, det. A. Vojnits, Vojnits gen. prep. No. 11762, ZSM Genitalprp. No. 10621 (Holotype, ZSM).

Older material. 1 ♂, India U. P., Naini-Tal, 6,600 ft., 31. viii. 1934, J. A. Graham, BM 1934-514, BM Geom slide 21999.

***Eupithecia asempiterna* Inoue, 2000**

Eupithecia asempiterna Inoue, 2000, *Tinea* **16** (Suppl. 1): 29, pl. 165, fig. 7, figs 1286, 1328. Replacement name for *Eupithecia sempiterna* Vojnits, 1988, praeocc., nec Vojnits, 1984.

A new species for the fauna of India. Habitus and male and female genitalia were illustrated in Inoue (2000).

Examined type material. ♂, E. Nepal, Sagarmatha, Solukhumbu, Thame Og, 3,800 m, 1–2. x. 1979, M. Owada (holotype, NSMT).

Other material. 1 ex., India, Himachal Pradesh, Kulu Valley, Solang Nala, 2,820 m, 7. x. 1977, P. Lamont (BMNH); 1 ♀, Indien, Himachal Pradesh, Rohtang-Pass, S-Seite, Gulaba, 32°22'N, 77°15'E, 2,500 m, 16. x. 1990, leg. H. Hacker (ZFMK); 6 ♀, same locality, unterhalb Mahri, 3,000 m, 17. x. 1990, leg. H. Hacker (ZFMK); 8 ♀, same locality, NO Kothi, 2,350 m, 19. x. 1990, leg. H. Hacker (ZFMK).

Remarks. It is curious that despite such a long series of females from Himachal Pradesh, no males have been found which appear to match this species in the collection of ZFMK. The private collection of M. Fibiger (Sorø, Denmark) contains a long series of 19 specimens of *E. asempiterna* from Nepal, but all these are also females. However, the type-series of *E. asempiterna* Inoue, 2000 included 14 males and 12 females.

***Eupithecia hannemanni* Vojnits & de Laever, 1973 (Fig. 2)**

Eupithecia hannemanni Vojnits & de Laever, 1973, *Acta zool. Hung.* **19**: 442, figs 4b, 8b, 10c.

Eupithecia manca Vojnits, 1979, *Acta zool. Acad. Sci. hung.* **25**: 433, fig. 10. **Syn. n.**

Hitherto known only from Western China.

Examined type material. ♂, Tapaishan im Tsinling, Sued-Shensi [Shaanxi] (China), 25. vi. 1935, H. Höne, Holotypus *Eupithecia hannemanni* Vojnits, 1972, Vojnits slide no 1162 (ZFMK slide no 338); ♀, same locality, 19. vi. 1935, H. Höne, Holotypus *Eupithecia manca* Vojnits, 1979, Vojnits slide no 12208 (ZFMK).

Recent material. 1 ♀, NW Pakistan, Prov. Swat, 71°90'E 35°70'N, Madyan, 1,400 m, 19. vi–4. vii. 1971, leg. Vartian, Vojnits slide no. 17445 (TTM).

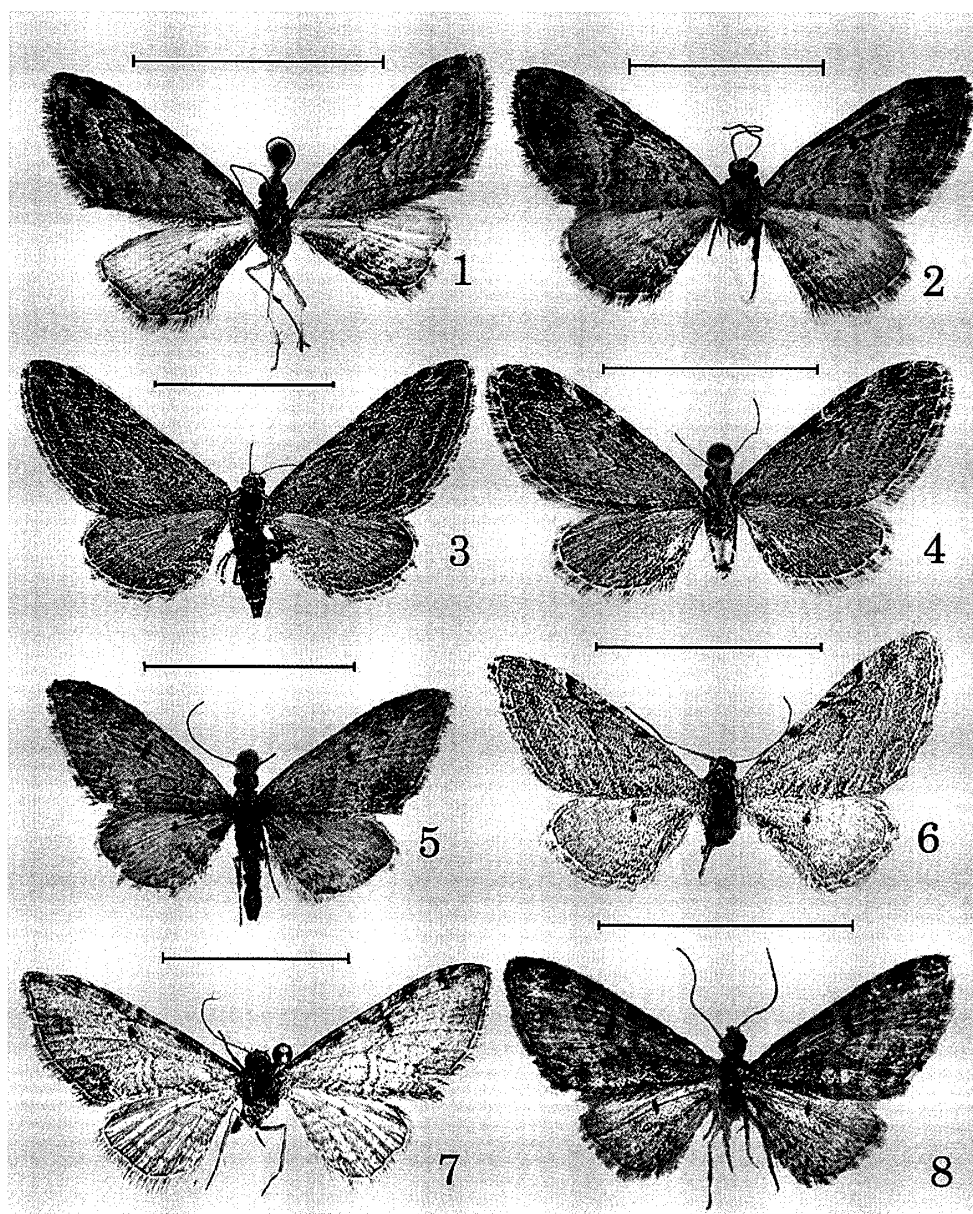
***Eupithecia barteli* Dietze, 1908**

Eupithecia barteli Dietze, 1908, *Dt. ent. Z. Iris* **21**: 162, pl. 2, figs 13, 14.

Eupithecia artshae Viidalepp, 1988, *Fauna pyadenits gor Srednej Azii* [Geometridae fauna of the Central Asian mountains]: 124, pl. 2, fig. 21; text-pl. 28, figs 2, 3, 6–8 (synonymised in Mironov, 1990).

This species was known from the southeastern European part of Russia, the European part of Kazakhstan, from Kirghizstan and Tajikistan. A new species for the fauna of Pakistan and India. Habitus and male and female genitalia were illustrated in Mironov (2003).

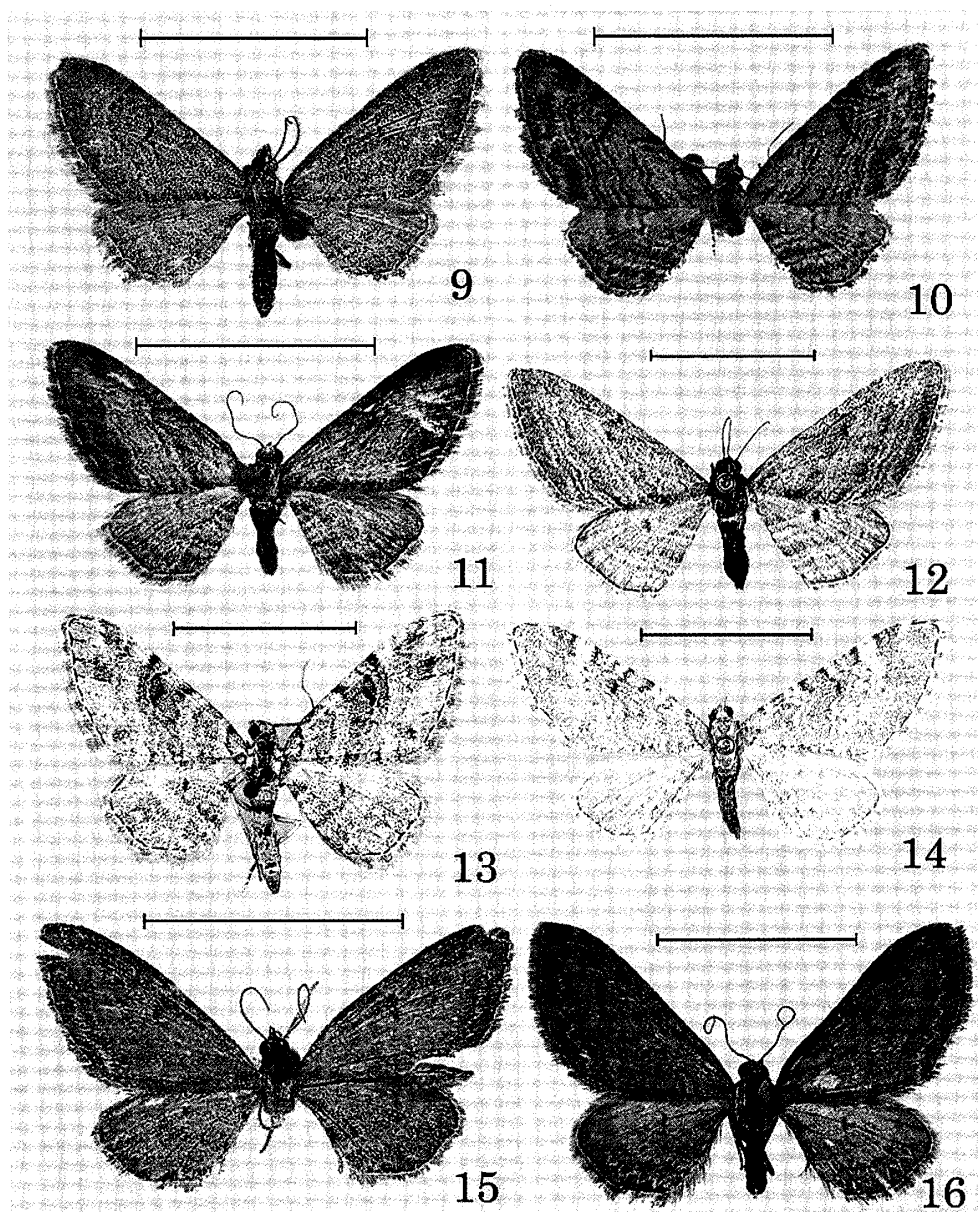
Examined type material. 1 ♀, Uralsk, Original ♀ (K. Dietze) (this syntype was examined



Figs 1-8. *Eupithecia* adults (scale bar=1 cm). 1. *E. coccinea* Vojnits, 1981 (paratype). 2. *E. han-nemanni* Vojnits & de Laever, 1973 (holotype). 3. *E. parallelaria* Bohatsch, 1893. 4. *E. mitigata* Dietze, 1906. 5. *E. efferata* Mironov & Ratzel, sp. n. (paratype). 6. *E. relaxata* Dietze, 1904. 7. *E. costipicta* Warren, 1893 (holotype). 8. *E. repetita* Vojnits, 1981 (holotype).

and lost, [MNHU]); ♂, Tajik. SSR [Tajikistan], SW Pamirs, Khorog, botanical garden, 2,300 m, 29. viii. 1965, leg. Zaprjagaev (holotype of *E. artshae*, ZISP).

Recent material. 1 ♂, W-Pakistan, Swat, N. v. Kalam, Gabral-Tal, 2,100 m, 6-9. vii. 1969, leg. G. Ebert, Vojnits slide no 12103 (TTM); 3 ♂, NW Pakistan, Prov. Swat, 15 km nördl. Kalam, Gabral-Tal, 2,100 m, 6-9. vii. 1969, leg. Vartian, Vojnits slides nos 15089, 15090, 15092; 1 ♀, N-Pakistan, Naltar, 2,950 m, 36°08'N, 74°12'E, Nr. 19, 18. vi. 1992, leg. M. Hreblay & G. Csorba, Vojnits slide no 19453 ♀ (TTM); 1 ♀, Indien, J & K, Ladakh, vic.



Figs 9–16. *Eupithecia* adults (scale bar=1 cm). 9. *E. subtilis* Dietze, 1910. 10. *E. egregiata* Mironov & Ratzel, sp. n. (holotype). 11. *E. brunneomarginata* Mironov & Galsworthy sp. n. (holotype). 12. *E. lindti* Viidalepp, 1988. 13. *E. exactata* Staudinger, 1882. 14. *E. nephelata* Staudinger, 1897. 15. *E. marginata* Staudinger, 1892. 16. *E. exicterata* Mironov & Ratzel, sp. n. (paratype).

Lotsun, 3,000 m, 31. vii. 1986, leg. W. Thomas (ZFMK); 1 ♀, Indien, Himachal Pradesh, Parvati Valley, 4 km NO Bhutar, 32°00'N, 77°14'E, 1,300 m, 24. x. 1990, leg. H. Hacker (ZFMK); 2 ♂, Pakistan, Azad Jammu & Kashmir, Thunian, 2,300–2,700 m, 25–30. viii. 2004, leg. V. Gurko, Ratzel slides nos GU26505/2m, GU29505/1m (coll. Ratzel).

Remarks. One syntype female of *E. barteli* Dietze, 1908 was examined by Mironov. It was irretrievably lost in transmission from Saint Petersburg to Berlin in 1992.

***Eupithecia fulvipennis* Butler, 1889**

Eupithecia fulvipennis Butler, 1889, *Illust. typical Specimens Lepid. Heterocera Colln Br. Mus.* 7: 23, 114, pl. 137, fig. 9.

Eupithecia uniformis Inoue, 2000, *Tinea* 16 (Suppl. 1): 43, pl. 166, fig. 16, fig. 1357. **Syn. n.**

Habitus and female genitalia illustrated by Inoue (2000) as *E. uniformis*.

Examined type material. 1 ♀, Dharmasala 87-59, bearing BMNH type label, BMNH Geometrid slide no. 21986; 1 ♂ (BM Geometrid slide no. 21985), 1 ♀, same label data except for type label (syntypes of *E. fulvipennis*, BMNH); ♀, E Nepal, Janakpur, Dolakha, Jiri, 1,860 m, 15-16. x. 1979, M. Owada, Inoue slide no 16624 (holotype of *E. uniformis*, NSMT).

Recent material. 1 ex. (abdomen missing), N-Indien, U. P., Kumaon-Himalaya, Nainital Distr., Bhimtal, 1,450 m, Sept. 1973, leg. Smetacek (SMNK); 3 ♂ 1 ♀, N. Indien, Uttar Pradesh, Kumaon, Himalaya, Bhimtal, Distr. Nainital, 1,500 m, 10-22. ix. (19)86, leg. A. Hauenstein (ZFMK).

Remarks. The type series consists of one male and two females, not three females as stated by Butler.

***Eupithecia parallelaria* Bohatsch, 1893 (Fig. 3)**

(*Eupithecia*) *unedonata* var. *parallelaria* Bohatsch, 1893, *Dt. ent. Z. Iris* 6: 22 (non binominal).

Not hitherto recorded from Kashmir.

Examined type material. Type series in coll. Staudinger (MNHU): ♀, Type ♀: Iris 1893 v. *parallelaria* Bohatsch, Origin, Zool. Mus. Berlin, Vojnits slide no 13574 (lectotype, designated by Vojnits (1982), MNHU—only the genitalia slide was available).

Recent material. 1 ♀, Pakistan, Hindukush Mts, 20 km E of Gupis, 73°37.6'E, 36°15.6'N, 2,100 m, 3. v. 1998, leg. Gy. M. László & G. Ronkay (TTM); 1 ♂ 3 ♀, Pakistan, Karakoram Mts, Naltar valley, 74°12'E, 36°09.6'N, 2,800 m, 9-10. v. 1998, leg. Gy. M. László & G. Ronkay (TTM); 2 ♀, same locality, 22. vi. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 10 ♂ 2 ♀, Pakistan, Kashmir, Himalaya Mts, Deosai Mts, Bubin village, 74°59'E, 35°12.6'N, 3,150 m, 11-13. v. 1998, leg. Gy. M. László & G. Ronkay (TTM); 1 ♂, same locality, 16. x. 1998, leg. Gy. M. László & G. Ronkay (TTM); 1 ♂ 3 ♀, Pakistan, Himalaya Mts, Nanga Parbat area, Astor, Rama, 74°48'E, 35°21'N, 3,300 m, 17. vi. 1998, leg. Gy. Fábrián & B. Herczig (TTM); 1 ♀, Pakistan, Himalaya Mts, Valley of Indus, between Chilas and Dasso, Motel Barseen, 1,100 m, 10. x. 1998, leg. Gy. M. László & G. Ronkay (TTM); 2 ♀, Pakistan, Kashmir, Himalaya Mts, Deosai Mts, Bubin Village, 3,150 m, 74°59'E 35°12.6'N, 11-13. v. 1998 and 12. x. 1988, leg. László & G. Ronkay, slides ACG GL62 and 73; 1 ♀, Pakistan, Karakoram Mts, Naltar Valley, 2,800 m, 74°12'E 36°09.6'N, leg. László & G. Ronkay (coll. László).

***Eupithecia emittens* Inoue, 1996**

Eupithecia emittens Inoue, 1996, *Trans. lepid. Soc. Japan* 47: 241, figs 5, 6, 10, 13.

Eupithecia mystica Vojnits, 1988, *Annls hist.-nat. Mus. natn. hung.* 80: 81, pl. 1, figs 6 (nec 7); pl. 4, figs 29-32. [Junior primary homonym of *Eupithecia gemellata* f. *mystica* Dietze, 1910.]. **Syn. n.**

Examined type material. ♂, Pakistan, Baltistan, 17 km Nord de Skardu, Route de Shigar, Alt. 2,300 m, 18. x. 1989, leg. F. Aulombard & J. Plante, BM Geom. slide no 19216 (holo-

type, BMNH); ♂, Tadžikistan, Badakhshan, Horog, 2,300 m, 4. vi. 1978 L, leg. Metsaviir, Raitviir & Viidalepp; Vojnits slide no 14952 (holotype of *E. mystica* [as *mysterica*] Vojnits, 1988; ZISP).

Recent material. 1 ♂, Indien, J & K, Ladakh, vic. Lotsun, 3,000 m, 13. vii. 1987, leg. W. Thomas (ZFMK); 1 ♂, Pakistan, Hindukush Mts, 5 km E of Shandur pass, 72°38'E, 36°07'N, 3,250 m, 24–25. vi. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 3 ♀, Pakistan, Himalaya Mts, Valley of Indus, between Chilas and Dassu, Motel Barseen, 1,100 m, 10 and 19. x. 1998, leg. Gy. M. László & G. Ronkay (TTM).

Remarks. The illustrations of the holotype of *E. hystericica* Vojnits, 1988 and the paratype of *E. mystica* Vojnits, 1988 were reversed in the Vojnits publication (Vojnits, 1988): the former was shown in fig 7, and the latter in fig 8. The original labels of all Vojnits slides belonging to *mystica* were erroneously inscribed '*mysterica*'.

Eupithecia mitigata Dietze, 1906 (Fig. 4)

(*Eupithecia*) *mitigata* Dietze, 1906, *Dt. ent. Z. Iris* **19**: pl. 2, figs 18, 19 (non binominal); *ibidem*, 1908, **21**: 168.

Not previously recorded from Kashmir.

Examined type material. ♂, Asia centr. Lob-Noor E. Mai 1904 Rückbeil sen. 4/05 v. Tancre, Cotype *mitigata* Dietze ♂, *mitigata* cotype K. Dietze, Zool. Mus. Berlin, Vojnits slide no 13587 (lectotype, MNHU, designated by Vojnits, 1982).

Recent material. 1 ♂, Indien, J & K, Ladakh, vic. Stok, 4,000 m, 21–22. viii. 1985, leg. W. Thomas (ZFMK); 1 ♂ 21 ♀, same locality, Kharbu, 2,800 m, 12. vii. 1987, leg. W. Thomas (ZFMK); 5 ♂ 9 ♀, same locality, vic. Lotsun, 3,000 m, 13, 25. vii. 1987 and 27. vii. 1988, leg. W. Thomas (ZFMK); 2 ♂ 9 ♀, same locality, 15 km ö Drass, 3,000 m, 27. vii. 1987, leg. W. Thomas (ZFMK); 2 ♂ 1 ♀, same locality, Khardung La, 4,100 m, 5. viii. 1988, leg. W. Thomas (ZFMK).

Eupithecia efferata Mironov & Ratzel, **sp. n.** (Fig. 5)

Description. Wingspan 17.5–19 mm; fore wing 9–9.5 mm. Fore wing elongate, fairly narrow, costa slightly arched, apex pointed; ground colour pale grey; transverse lines inconspicuous; basal line obliquely dentate, sharply angled near costa; antemedial, medial and postmedial lines oblique, straight, right angled onto costa; terminal area slightly darker with indefinite, whitish, wavy subterminal line; terminal line narrow, brownish grey, interrupted by veins; discal dot oblique, narrow and elongate, black. Fringes chequered dirty white and brownish grey. Hind wing ovoid, with very shallow hollow in termen; ground colour whitish grey; transverse lines broad, dark, blackish brown, very distinct along anal margin only; terminal area slightly darker, especially near tornus; discal dot rounded, smaller and paler than on fore wing; terminal line and fringes as fore wing.

Male genitalia (Fig. 17). Uncus thin, biapical. Valve shaped like an orange segment, rather short and broad, with slightly concave dorsal margin, with medially angulated ventral margin and with narrow, almost pointed apex; sacculus lightly sclerotized. Vinculum trapezoid. Papillae on anterior arms of labides large, thick, clavate, covered by short setae in apical half. Aedeagus short and relatively thin, almost equal to length of valve. Vesica multiply granulate, armed with one large, twisted V-shaped cornutus. Sternite A8 peg-like, broadened at base, basal hollow rather broad and deep.

Female genitalia (Fig. 20). Bursa copulatrix large, pear-shaped, almost completely covered with dense small, slim spines. Ductus bursae more sclerotized, striate, with small separate patch of a few slim spines. Ductus seminalis broadened at base, evenly curved, broadly attached to ductus bursae on right side. Colliculum collar-like, short and narrow, inclined to right. Antrum broad, lightly sclerotized, covered with numerous pores. Tergite A8 short and broad, with heavily sclerotized and medially convex anterior margin and with rounded posterior corners. Anterior and posterior apophyses short and thin. Papillae anales large, rounded, covered by relatively elongate setae.

Similar species. This species belongs to the *innotata* group. It is externally rather similar to a specimen of *Eupithecia perturbatrix* Dietze, 1906 from NW China, which was illustrated by Dietze (1908, pl. 3, fig. 4) but distinguished from this latter by the different shape of the fore wings. The male genitalia of *E. efferata* sp. n. lack the two apical horn-like cornuti on the vesica which are typical of this group, as do the allied species *E. omniparens* Dietze, 1908 and *E. relaxata* Dietze, 1908 (Vojnits 1982). The female genitalia of the new species are well distinguished by the presence of the separate patch of spines in the ductus bursae.

Holotype. ♀, Pakistan, near Chilim, Deosai Mts, 3,500 m, 17. viii. 2004, leg. V. Gurko, Ratzel slide no GU12705/3w (SMNK). Paratypes. 1 ex., Indien, J & K, Sonamarg, 2,700 m, 28. vii. 1987, leg. W. Thomas (ZFMK); 3 ♂ 1 ♀, same locality, 2,900 m, 13. viii. 1988, leg. W. Thomas (ZFMK); 1 ♀, Pakistan, near Chilim, Deosai Mts, 3,500 m, 17. viii. 2004, leg. V. Gurko, Ratzel slide no GU22505/3w (coll. Ratzel).

Eupithecia relaxata Dietze, 1904 (Fig. 6)

(*Eupithecia*) *unedonata* var. *relaxata* Dietze, 1904, *Dt. ent. Z. Iris* **16**: 367, pl. 5, fig. 17 (non binominal).

(*Eupithecia*) *costisignata* Dietze, 1904, *Dt. ent. Z. Iris* **16**: 367, pl. 5, figs 18, 19 (non binominal). Syntypes 11, ♂, ♀ (MNHU), Central Asia [Iran]: Schakuh [=Shahkuh]; [China]: Korla. **Syn. rev.**

Eupithecia pamiri Vojnits, 1988, *Annls hist.-nat. Mus. natn. hung.* **80**: 81, pl. 1, figs 3-5; pl. 4, figs 25-28.

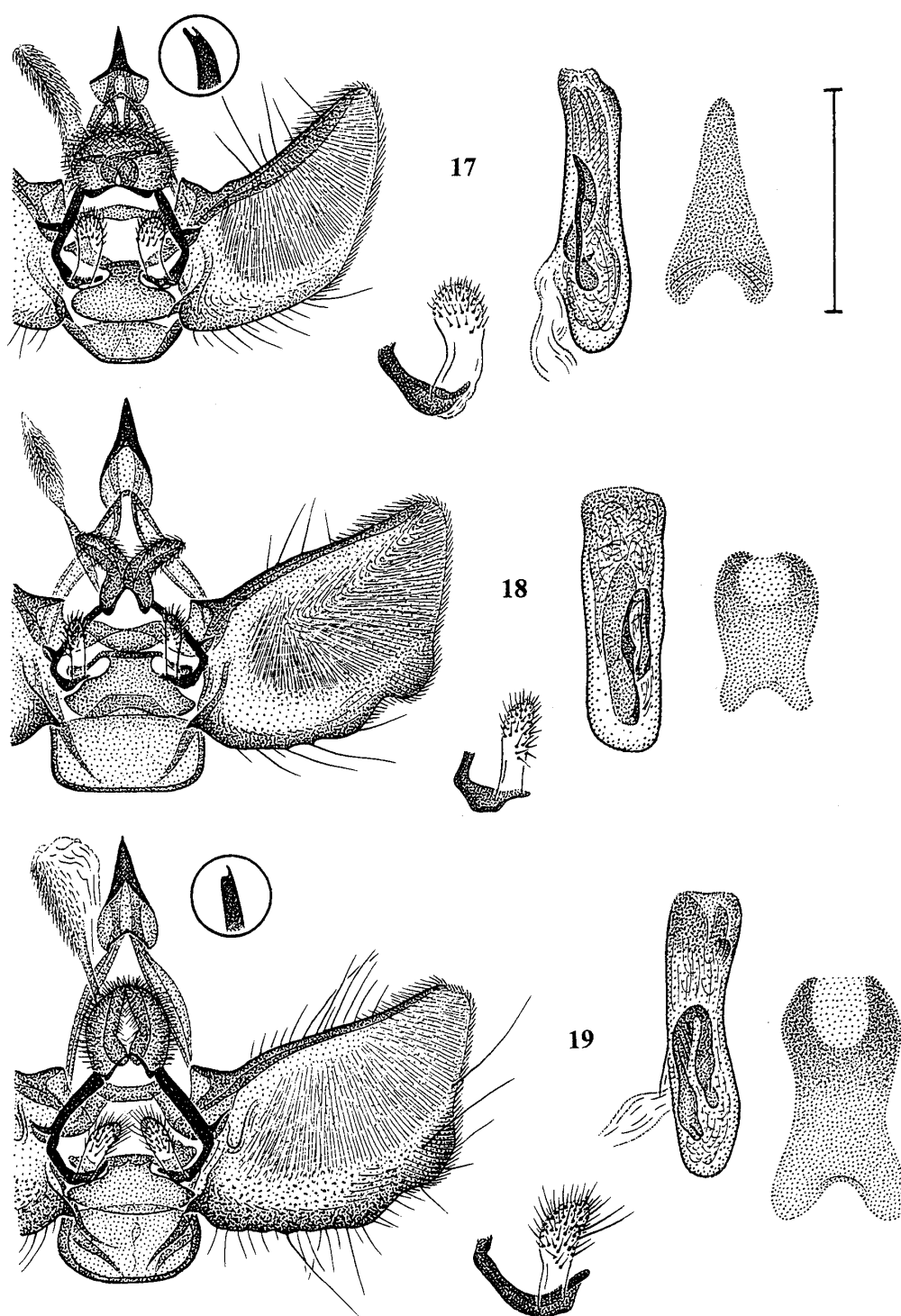
Syn. n.

Misidentification: *emittens* Inoue, 1996, *Trans. Lepid. Soc. Japan* **47**: 241 (at least 1 ♀ paratype in ZISP).

This species, which belongs to the *innotata* group, is very common in the mountain areas of Central Asia. However, it has not hitherto been recorded from Pakistan or India.

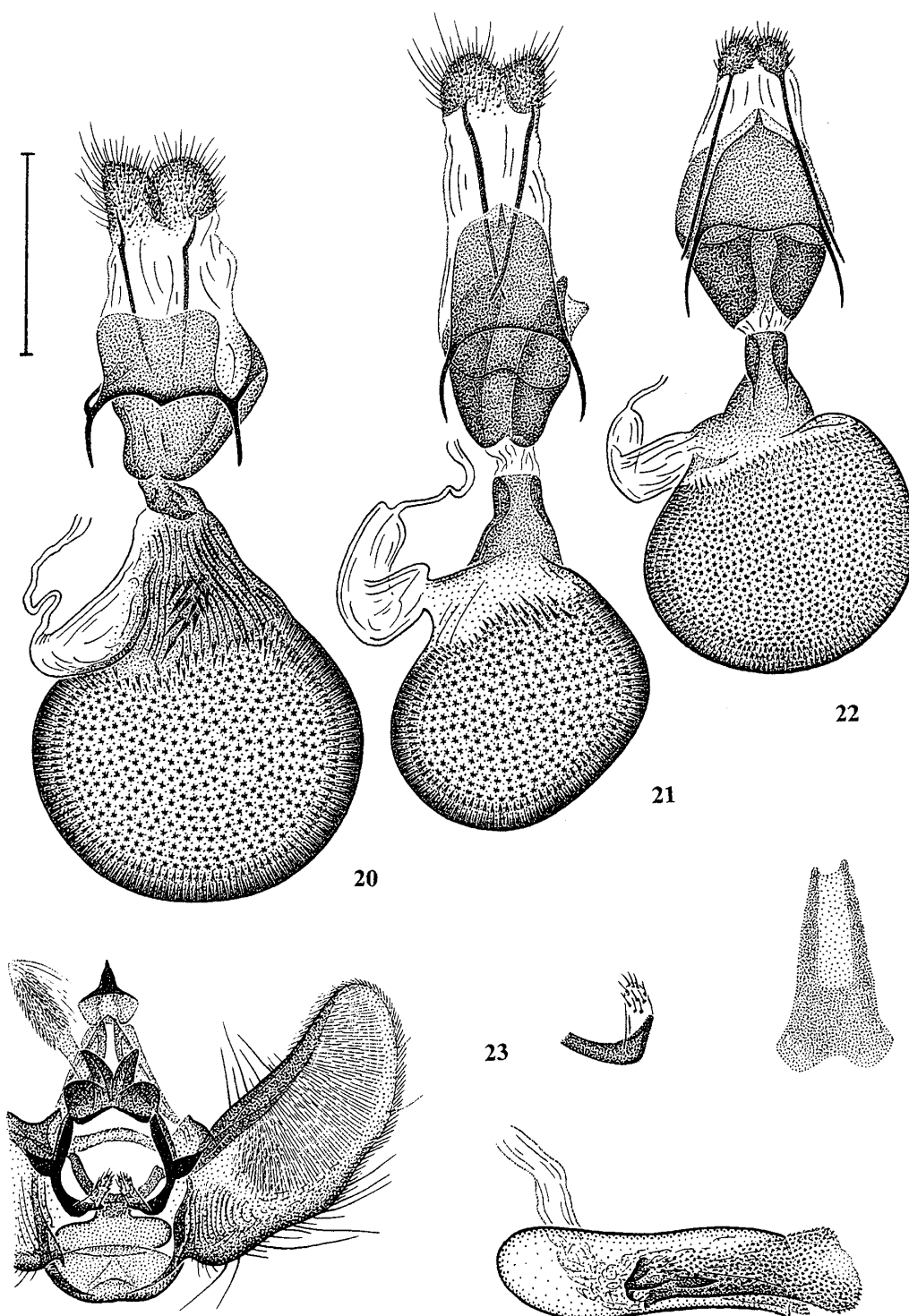
Examined type material. ♀, [Iran] Schakuh, Funke, 31. vii. (18)98, Typus, *costisignata* form. *relaxata*, ex coll. Dietze, slide no Eu 104 (holotype of *E. relaxata*, MNHU); 1 ♀, *costisignata* Typ., Korla, De Laever prep. No 1659.2; 1 ♂, *costisignata* Korla, De Laever prep. No 1659.1 (syntypes of *E. costisignata* Dietze, MNHU); ♂, [Tajikistan], Pamir merid. occid., Mts Schachdarensis, Cliv septr., fl. Seidj-dara, 3,250 m, 27. vii. (19)57, A. Bundel, Vojnits slide no 17686 (holotype of *E. pamiri*, ZISP); 1 ♀, Pakistan, Baltistan, 17 km Nord de Skardu, Route de Shigar, Alt. 2,300 m, 18. x. 1989, F. Aulombard et J. Plante (paratype of *E. emittens*; ZISP).

Recent material. 1 ♀, Indien, J & K, Kashmir, vic. Sonamarg, 2,900 m, 25. vii. 1988, leg. W. Thomas (ZFMK); 1 ♂ 2 ♀, Indien, J & K, Ladakh, vic. Fatu-La, 3,700 m, 7+8. vii. 1981, leg. W. Thomas, Lep1997-14 (SMNS); 1 ♂ 1 ♀, same locality, vic. Kharbu, ca 3,000 m, 30. vii. 1981, leg. W. Thomas, Lep1997-14 (SMNS); 1 ♂, same locality, Khardung La, ca. 2800 m, 11. viii. 1984, leg. W. Thomas, Lep1997-11 (SMNS); 1 ♂, same locality, 15 km östl. Drass, 3,000 m, 26. vii. 1988, leg. W. Thomas (ZFMK); 11 ♂ 9 ♀, same locality, 4,100 m, 5. viii. 1988, leg. W. Thomas (ZFMK, ZISP); 1 ♂ 3 ♀, same locality, 4,500 m, 7. viii. 1988, leg. W. Thomas (ZFMK); 1 ♂ 1 ♀, same locality, vic. Lotsun, ca 3,000 m, 10. viii. 1988, leg. W. Thomas (ZFMK); 1 ♀, same locality, vic. Kharbu, ca 2,800 m, 11. viii. 1988, leg.



Figs 17–19. Male genitalia of *Eupithecia* species (scale bar=1 mm: with sternite A8, and lateral view of uncus and papillae on the anterior arms of labides enlarged). 17. *E. efferata* Mironov & Ratzel, sp. n. 18. *E. egregiata* Mironov & Ratzel, sp. n. 19. *E. brunneomarginata* Mironov & Galsworthy, sp. n.

W. Thomas (ZFMK); 1 ♂, Pakistan, Himalaya Mts, Kashmir, Deosai Mts, Bubin village, 75°02'E, 35°13.5'N, 3,300 m, 6. vii. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 1 ♀, same



Figs 20-23. Male and female genitalia of *Eupithecia* species (scale bar=1 mm: male with sternite A8, and lateral view of papillae on the anterior arms of labides enlarged). 20. *E. efferata* Mironov & Ratzel sp. n., female. 21. *E. brunneomarginata* Mironov & Galsworthy, sp. n., female. 22. *E. egregiata* Mironov & Ratzel, sp. n., female. 23. *E. costipicta* Warren, 1893, male.

locality, but 3,150 m, 74°59'E, 35°12.6'N, 15. viii. 1998, leg. G. Ronkay & Z. Varga, slide ACG GL13; 1 ♂, Pakistan, Hindukush Mts, 5 km E of Shandur pass, 3,250 m, 72°38'E 36°07'N, 24–25. vi. 2000, leg. Z. Varga & G. Ronkay; 1 ♂, Pakistan, Karakoram Mts, Naltar Valley, 2,800 m, 74°12'E, 30°09.6'N, 14. viii. 1998, leg. Z. Varga & G. Ronkay, slide ACG GL48 (coll. László); 5 ♂ 15 ♀, Pakistan, Deosai Mts, near Chilim, 3,500 m, 17. viii. 2004, leg. V. Gurko (coll. Ratzel); 2 ♂ 1 ♀, Pakistan, Great Himalaya Mts, near Gabar, 3,200 m, 21–24. viii. 2004, leg. V. Gurko (coll. Ratzel).

Remarks. There is considerable confusion over the identity of *E. relaxata*, partly due to Dietze's decision to reverse his original designation of *costisignata* as an ab. of *relaxata* (Dietze, 1904), and to refer (Dietze, 1913) to *relaxata* as a form of *costisignata*. Prout (1938) pointed out that since Dietze had described *relaxata* first by page priority, this name should take precedence. Vojnits (1982) disagreed, though without any clear explanation. Scoble *et al.* (1999) treats *relaxata* and *costisignata* as separate species. Vojnits had failed to find the holotype female of *relaxata*, and regarded it as a "species inquirenda". We have examined a specimen in MNHU, Berlin, (details above) which appears to be the holotype of *relaxata*: it bears a label describing it as "Typus, *costisignata* form. *relaxata*", which we believe must have been added after Dietze's 1913 publication, but in other respects fits exactly the details given in Dietze's 1904 paper, particularly as to location and date. There was evidently a genitalia preparation, the number of which is given on the pin, but we have been unable to find this. Externally the specimen appears to be the same species as the syntypes of *costisignata* which we have examined, together with a large amount of more recent material.

At least one paratype (female) of *E. emittens* Inoue, 1996, which was kindly presented by Prof. Dr H. Inoue to the ZISP collection, is referable to *relaxata*.

***Eupithecia costipicta* Warren, 1893 (Fig. 7)**

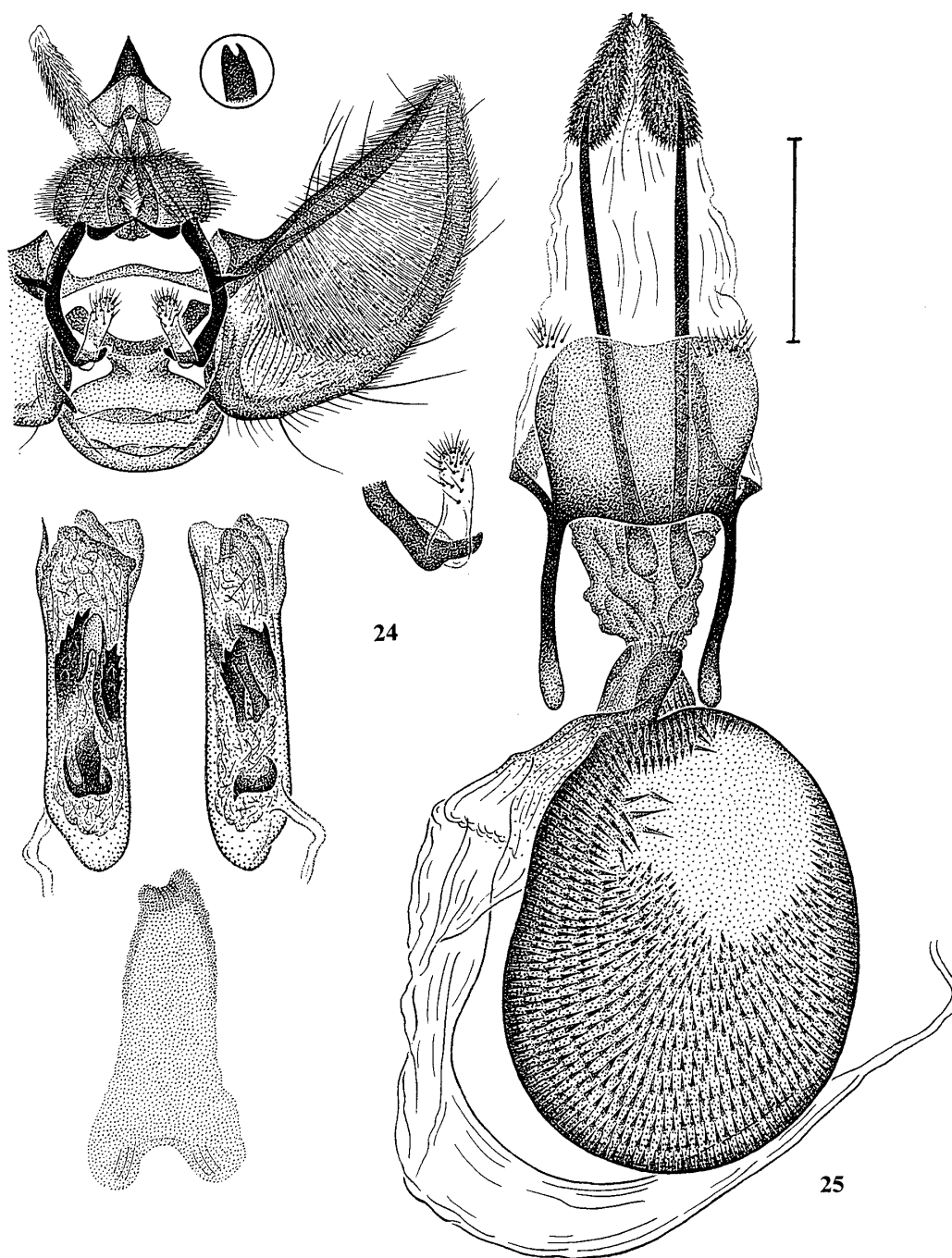
Eupithecia costipicta Warren, 1893, *Proc. zool. Soc. Lond.* **1893**: 383, pl. 30: 21.

This little known and rare Asian species was described on the basis of a single female from Sikkim. We describe and illustrate the male genitalia of *E. costipicta* here on the basis of specimens from Kashmir.

Male genitalia (Fig. 23). Uncus short, pointed to apex, biapical. Valve elongate, with almost parallel dorsal and ventral margins; dorsal margin slightly curved; ventral margin slightly sinuate in basal half; sacculus lightly sclerotized. Vinculum short and relatively broad. Papillae on the anterior arms of labides relatively short and thin, covered with sparse, short setae. Aedeagus broad and long, almost equal to length of valve. Vesica covered with numerous minute spinules and armed with one elongate and broad, plate-like cornutus and one smaller, sharply folded, irregular cornutus at ductus ejaculatorius base. Sternite A8 with two narrow apical arms, about one half of the length of sternite, with slightly expanded and blunt apices; basal hollow shallow; apical hollow membranous, narrow and deep.

Examined type material. ♀, Sikkim, O. Möller, 8000, 89, *Eupithecia costipicta* Warr. Type ♀, Collection H. J. Elwes, BM Geom. slide no 20130 (holotype, BMNH).

Recent material. 3 ♂, Pakistan, Deosai Mts, near Chilim, 3,500 m, 17. viii. 2004, leg. V. Gurko, Ratzel slides nos 10705/2m, 10705/3m (coll. Ratzel); 4 ♂, Pakistan, Azad Jammu & Kashmir, Thunian, 2,300–2,700 m, 25–30. viii. 2004, leg. V. Gurko (coll. Ratzel).



Figs 24–25. Male and female genitalia of *E. exicterata* Mironov & Ratzel sp. n. (scale bar=1 mm: male with sternite A8, and lateral view of uncus and papillae on the anterior arms of labides enlarged, and two lateral views of aedeagus). 24. Male. 25. Female.

***Eupithecia centaureata* ([Denis & Schiffermüller], 1775)**

Geometra centaureata ([Denis & Schiffermüller], 1775), *Ankündigung syst. Werkes Schmett. Wienergegend*: 114.

Eupithecia oblongata Thunberg, 1784, *Diss. ent. sistens Insecta Suecica* **1**: 14.

Eupithecia oblongata var. *centralisata* Staudinger, 1892, *Dt. ent. Z. Iris* **5**: 250.

Eupithecia chinae Vojnits, 1977, *Acta zool. Acad. Sci. hung.* **23**: 231, figs 4, 5b. (Synonymised by Mironov and Galsworthy (2007)).

A widespread Palearctic species ranging from Morocco and Portugal eastward to Taiwan. It was first mentioned for Kashmir from the Scinde Valley as *Eupithecia oblongata* Thunberg, 1784 by Hampson (1903). The Kashmirian specimens belong to the paler form *centralisata* Staudinger, 1892, rather than to the nominate European form.

Recent material. 1 ♀, Indien, J+K, Ladakh, 3,100 m, 22, 26. vii. 1980, leg. W. Thomas, Lep1997-11 (SMNS); 1 ♀, Indien, J+K, Zanakar, Penei-La, 4,000–4,500 m, 12–17. vii. 1981, leg. W. Thomas, Lep1997-11 (SMNS); 1 ♂, Pakistan/Gilgit, Naltar, 3,000–3,200 m, 19–23. vii. 1982, leg. Eckweiler, Lep1997-11 (SMNS); 1 ♂, Indien, J & K, Ladakh, vic. Lotsun, 3,000 m, 13. vii. 1987, leg. W. Thomas (ZFMK); 2 ♂ 1 ♀, same locality, 15 km ö Drass, 3,000 m, 27. vii. 1987, leg. W. Thomas (ZFMK); 1 ♂, Pakistan, Himalaya Mts, Kashmir, Deosai N. P., Deosai Plains, 75°12'14"E, 35°00'43"N, 3,950 m, 15. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 1 ♂, Pakistan, Karakoram Mts, Naltar valley, 74°12'E, 36°09'N, 2,800 m, 22. vi. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 1 ♀, Pakistan, Kashmir, Himalaya Mts, Deosai Mts, Bubin village, 74°59'E, 35°12,6'N, 3,150 m, 1–2. vii. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 1 ♂, Pakistan, Himalaya Mts, Kashmir, Deosai Mts, Bubin village, 75°02'E, 35°13.5'N, 3,300 m, 3. vii. 2000, leg. Z. Varga & G. Ronkay (ZISP); 1 ♂ 1 ♀, same locality, 6. vii. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 1 ♂, Pakistan, Karakoram Mts, Naltar valley, 74°12'E, 36°09.6'N, 2,800 m, 8. vii. 2000, leg. Z. Varga & G. Ronkay (ZISP).

Eupithecia repetita Vojnits, 1981 (Fig. 8)

Eupithecia repetita Vojnits, 1981, *Annls hist.-nat. Mus. natn. hung.* **73**: 225, figs 7, 8.

A species so far known only from the western Himalayas.

Examined type material. ♂, W-Pakistan, Swat, Kalam, 2,000 m, 9. vii. 1969, leg. G. Ebert, Vojnits slide no 12105 (holotype, SMNK); 1 ♂ 2 ♀, same locality and data, Vojnits slides nos 12107, 12118, 12114 (paratypes, SMNK); 1 ♂, same locality and data, Vojnits slide no 12116 (paratype, TTM); 1 ♂ 5 ♀, W-Pakistan, Swat, N. v. Kalam, Gabral-Tal, 2,100 m, 6–9. vii. 1969, leg. G. Ebert, Vojnits slides nos 12104, 12112, 12106, 12111, 12115, 12117 (paratypes, SMNK); 1 ♀, same locality and data, Vojnits slide no 12109 (paratype, TTM).

Recent material. 1 ♂ 1 ♀, Indien, J & K, Kashmir, Sonamarg, 2,700 m, 10–11 and 28. vii. 1987, leg. W. Thomas (ZFMK); 4 ♂ 1 ♀, Pakistan, Kohistan, Swat prov., Mlandam, 72°32'E, 35°10'N, 1,800 m, 25. vi–5. vii. 1992, leg. Z. Weidenhoffer (ZFMK); 4 ♂ 4 ♀, Pakistan, Himalaya Mts, Kaghan valley, 20 km NE Balakot Tathabaya, 73°25'E, 34°41'N, 2,400 m, 25 and 27. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 1 ♂, same locality, Tathabaya, 73°27'01"E, 34°36'48"N, 2,300 m, 22–23. vii. 1998, leg. G. Csorba & L. Ronkay (TTM).

Eupithecia subtilis Dietze, 1910 (Fig. 9)

Eup(ithecia) staudingeri f. *subtilis* Dietze, 1910, *Biologie der Eupitheciiden* **1**: pl. 79, figs 870, 871; pl. 80, fig. 900.

Eupithecia tonu Viidalepp, 1988, *Fauna pyadenits gor Srednej Azii [Geometridae fauna of the Central Asian mountains]*: 118, pl. 2, fig. 16; text-pl. 26, fig. 1. **Syn. n.**

This species is known from Iran, Uzbekistan, Kirghizstan and Tajikistan. It has not hitherto been recorded from Pakistan.

Examined type material. ♀, [Iran], Schahkuh, *subtilis* Dietze, ? *staudingeri*—Form, Typ, n. spec., ♀, cf. Dietze, Iris 19, T. 7, 105 (lectotype, here designated, coll. Dietze, MNHU); ♀,

Tajik. SSR [Tajikistan], SW Alai, Dzhirgatal, 1,700 m, 3. viii. 1981, at light, leg. Talve & Keskkula (holotype of *E. tonu*, IAET).

Recent material. 1 ♀, Pakistan, Hindukush Mts, 5 km E of Shandur pass, 72°32'E, 36°10'N, 3,500 m, 13. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 1 ♂ 1 ♀, same locality, 72°38'E, 36°07'N, 3,250 m, 24–25. vi. 2000, leg. Z. Varga & G. Ronkay (ZFMK).

Remarks. *E. subtilis*, originally as ?form *staudingeri*, was based on three illustrations in Dietze (1910), without any accompanying description. Under the code, the name is nevertheless valid. The key to the illustrations makes it clear that the two specimens in plate 79, figs 870 and 871, were intended to be type specimens (not that figured in plate 80, fig 900, contra Scoble *et al.* (1999)). Both were said to be in the Petersen collection, and to have been collected at Shahkuh in northern Iran. In the second part of his work (Dietze, 1913), the concordance to the names refers under *subtilis* to papers by Dietze (1906), p. 66, and Petersen (1909), p. 278, in which, respectively, a text description and male and female genitalia drawings are given under “*Eupithecia spec.*” and “*E. sp.*”. The 1906 description was based on a single specimen, but with the additional comment “also in the collection of the Russian Imperial Academy of Sciences in St Petersburg”. The single specimen in question may be that illustrated in plate 80, fig 900 of Dietze (1910). The genitalia diagrams in Petersen were clearly based on the specimens from the Petersen collection, both of which, when illustrated by Dietze, lacked abdomens.

A search of the Dietze collection in MNHU has produced one specimen with a type marking. Comparison with the photographic reproduction in Dietze (1910) shows that this is the specimen illustrated in plate 79, fig 870, and a marking on the labels indicates that it is female. Petersen's genitalia preparation was not found. The whereabouts of Petersen's male is not known, nor of the other specimen illustrated by Dietze. However, Petersen's clear illustrations match the male and female genitalia of modern material, and there is no reason to doubt that they are correctly matched.

In order to stabilise the nomenclature, we therefore designate the female specimen detailed above as lectotype.

***Eupithecia egregiata* Mironov & Ratzel, sp. n. (Fig. 10)**

Description. Wingspan 18–20 mm; fore wing 9.5–10.5 mm. Fore wing elongate, costa slightly arched, termen oblique, apex pointed; ground colour soft whitish grey; all transverse lines clear, brown, narrow and oblique, sharply angled near costa; terminal area darker, brownish grey, especially in inner half, with broad, sinuate, whitish subterminal line; terminal line narrow, blackish brown, interrupted by vein ends; discal dot large, oblique, elongate and narrow, black. Fringes chequered dirty white and light brownish grey. Hind wing with shallow medial hollow in terminal margin; ground colour whitish grey; transverse lines, especially basal and postmedial clear, dark, brownish grey; terminal area darker with narrow, whitish dentate subterminal line; discal dot narrow and elongate, but smaller and paler than on the fore wing; terminal line and fringes as fore wing.

Male genitalia (Fig. 18). Uncus large, stout and elongate. Valve large, broad, with slightly bowed dorsal margin, with sclerotized, wrinkled, broad and blunt process in ventral margin, preceded by shallow medial hollow and with narrowly rounded apex; sacculus sclerotized. Vinculum rather short and broad, rectangular with rounded corners. Papillae on the anterior arms of labides large, elongate, clavate with straight inner margins and prominent, rounded outward margins, densely covered by stout setae. Aedeagus slim, short, shorter than valve length. Vesica covered by minute spines; armed with one large, curved, horseshoe-shaped

cornutus with one arm longer and broader than the other. Sternite A8 small, short, narrowed near base, with two more sclerotized, broad, sharply incurved and apically blunt lobes; basal hollow rather shallow; apical hollow membranous, rounded, broad and deep.

Female genitalia (Fig. 22). Bursa copulatrix large, globular, completely covered with very small, slim spines. Ductus bursae spineless, sclerotized, with membranous base, tapered to colliculum. Ductus seminalis broadened at base; attached to base of ductus bursae on right side. Colliculum collar-like, short and narrow. Antrum large, broad, funnel-shaped, strongly sclerotized, with two long and broad ventral lobes. Tergite A8 campaniform, elongate and relatively narrow, with convex anterior margin, rounded posterior corners and with pointed medial projection on the posterior margin. Anterior and posterior apophyses relatively short and thin, not expanded at apices; spurs of anterior apophyses very short and thin. Papillae anales very small, rounded.

Similar species. This species belongs to the *centaureata* species-group. It is externally similar to *E. distinctaria* Herrich-Schäffer, 1848, but has more oblique transverse lines, which are sharply angled onto the costa of the fore wing. The male and female genitalia are typical for species from the *centaureata* group.

Holotype. ♂, NW-Pakistan, Prov. Swat, Gabral-Tal, 15 km nördl. Kalam, 2,100 m, 6–9. vii. 1969, leg. Vartian, Vojnits slide no 15674 (TTM). Paratypes. 1 ♀, same locality, Vojnits slide no 15132 (TTM); 1 ♀, SO-Afghanistan, Safed Koh, S-Seite, Kotkai, 2,350 m, 25. vii. 1968, leg. M. Müller, Vojnits slide no 19368 (TTM); 1 ♀, W-Pakistan, Swat, N v. Kalam, Gabral-Tal, 2,100 m, 6–9. vii. 1969, leg. G. Ebert, Vojnits slide no 12108 (paratype of *E. repetita* Vojnits, 1981, SMNK); 1 ♀, Pakistan, Great West. Himalaya Mts, near Gabar, 3,200 m, 21–24. viii. 2004, leg. V. Gurko, Ratzel slide no 1905/5m (coll. Ratzel).

***Eupithecia brunneomarginata* Mironov & Galsworthy, sp. n. (Fig. 11)**

Description. Wingspan 17.5–19 mm; fore wing 9–10.5 mm. Fore wing elongate, narrow, costa straight, curved near apex only, termen oblique, apex narrow, almost pointed; ground colour pale grey, with darker, rusty brown terminal area especially dark near apex; transverse lines brown, distinct and narrow, obliquely straight, sharply angled near costa; postmedial line oblique also but slightly sinuate; terminal area with inconspicuous light subterminal line; terminal line narrow, black or dark brown, interrupted by veins; discal dot indistinct, pale, narrow and elongate. Fringes chequered light, whitish grey and dark, brownish grey. Hind wing slightly elongate, with shallow hollow in terminal margin near apex; ground colour paler, grey; transverse lines relatively distinct, especially ante- and postmedial; terminal area slightly darker with rusty tinge near tornus; discal dot inconspicuous, paler than on the fore wing, narrow and elongate; terminal line and fringes as fore wing.

Male genitalia (Fig. 19). Uncus large, stout and elongate, but narrow when viewed laterally, uniapical with short ventral projection near apex. Valve large, broad, with bowed dorsal margin, with a sclerotized, wrinkled, broad and blunt process in the ventral margin, preceded by a shallow medial hollow; apex of valve almost triangular, but blunt at extreme apex; sacculus heavily sclerotized. Vinculum rather short and broad, ovoid. Papillae on anterior arms of labides large, elongate, clavate with straight inner margins and prominent, rounded outer margins, densely covered by stout setae. Aedeagus short and slim, shorter than valve length. Vesica covered by minute spines, and armed with one small, lightly sclerotized, rounded apical cornutus and one large, curved, horseshoe-shaped cornutus at ductus ejaculatorius base. Sternite A8 rather elongate and narrow, narrowed medially, with two more sclerotized, broad, slightly incurved and apically blunt lobes; basal hollow broad and deep;

apical hollow membranous, also broad and deep.

Female genitalia (Fig. 21). Bursa copulatrix large, ovate, completely covered with small, slim spines. Ductus bursae sclerotized, with membranous base, tapered to colliculum. Ductus seminalis broadened at base; attached to base of ductus bursae on right side. Colliculum collar-like, short and narrow. Antrum large, broad, funnel-shaped, strongly sclerotized, with two long and broad ventral lobes. Tergite A8 elongate and relatively narrow, with concave anterior margin, rounded posterior corners and with pointed medial tip on the posterior margin. Anterior and posterior apophyses short and thin, not expanded at apices; spurs of anterior apophyses very short and thin. Papillae anales small, short and rounded.

Similar species. Like the last, this species also belongs to the *centaureata* group. It is externally similar to the preceding species *E. egregiata* Mironov & Ratzel, but distinguished from it by the narrower transverse lines, narrower, rather indistinct discal spots and darker terminal area on the fore wings and also by the absence of discal spots on the hind wings. The male genitalia of *E. brunneomarginata* sp. n. have the papillae on the anterior arms of the labides thicker in the apical part, and the eighth sternite is larger and longer, more narrowed in the medial part, and with straighter apical lobes. In the female genitalia the papillae anales are much larger than those in *E. egregiata*.

Holotype. ♀, Pakistan, Karakoram Mts, Naltar valley, 74°12'E, 36°09.6'N, 2,800 m, 22. vi. 2000, leg. Z. Varga & G. Ronkay (ZFMK). Paratypes. 1 ♀, same locality and details (ZFMK); 1 ♀, same locality, but 18. vii. 1998, leg. G. Csorba & L. Ronkay (coll. László); 1 ♀, same locality, but 74°09'22"E, 36°11'08"N, 2,900 m, 20. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 1 ♀, same locality, but 74°12'E, 36°09'N, 2,800 m, 30. vi. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 1 ♂, Pakistan, Kashmir, Himalaya Mts, Deosai Mts, Bubin village, 74°59'E, 35°12.6'N, 3,000 m, 16. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 1 ♀, same locality, 3,150 m, 1–2. vii. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 1 ♀, Pakistan, Hindukush Mts, 5 km E of Shandur pass, 72°38'E, 36°07'N, 3,250 m, 24–25. vi. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 1 ♂, Pakistan, Deosai Mts, near Chilim, 3,500 m, 17. viii. 2004, leg. V. Gurko, Ratzel slide no 1905/1m (coll. Ratzel).

Eupithecia lindti Viidalepp, 1988 (Fig. 12)

Eupithecia lindti Viidalepp, 1988, *Fauna pyadenits gor Srednej Azii* [Geometridae fauna of the Central Asian mountains]: 113, pl. 1, fig. 16; text-pl. 24, figs 1–4.

Eupithecia hangayorum Vojnits, 1988, *Annls hist.-nat. Mus. natn. hung.* **80**: 84, pl. 1, figs 1–2 (nec pl. 2, figs 15–16); pl. 6, figs 45–48. **Syn. n.**

This species was previously known only from the mountains of Uzbekistan and Tajikistan. It is a new species for the fauna of Pakistan and India.

Examined type material. ♂, Uzb. SSR [Uzbekistan], kur. Chimgan, 26. vi–1. vii. 1981, at light, leg. A. Lindt (holotype, IAET); ♂, [Tajikistan], Darwaz occid. Mts, Chazret-scho, fl. Don Duschlan, 2,200 m, vii. 1959, leg. A. Bundel (holotype of *E. hangayorum*, ZISP).

Recent material. 1 ♂ 1 ♀, Indien, J & K, Zanshar, Pensi-La, 4,000–4,500 m, 12–17. vii. 1981, leg. W. Thomas (SMNS); 2 ♂ 2 ♀, Indien, J & K, Ladakh, Kharbu, 2,800 m, 12. vii. 1987, leg. W. Thomas (ZFMK); 4 ♂ 5 ♀, same locality, vic. Lotsun, 3,000 m, 13 and 25. vii. 1987, leg. W. Thomas (ZFMK, ZISP); 1 ♀, Pakistan, Karakoram Mts, 52 km N of Gilgit, Chaprot, 74°16'00"E, 36°15'13"N, 2,350 m, 12. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 9 ♂ 3 ♀, Pakistan, Kashmir, Himalaya Mts, Deosai Mts, Bubin village, 74°59'E, 35°12.6'N, 3,000 m, 16. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 43 ♂ 21 ♀, same lo-

cality, 3,150 m, 1–2. vii. 2000, leg. Z. Varga & G. Ronkay (ZFMK, ZISP); 1 ♀, Pakistan, Karakoram Mts, Naltar valley, 74°09'22"E, 36°11'08"N, 2,900 m, 20. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 5 ♂ 2 ♀, same locality, 74°12'E, 36°09'N, 2,800 m, 30. vi. 2000, leg. Z. Varga & G. Ronkay (ZFMK).

Remarks. All Vojnits slides belonging to this species are labelled '*hangayae*' rather than '*hangayorum*'.

It appears that the monograph of Viidalepp (1988) was published earlier than the paper of Vojnits (1988), and that therefore, the species name *E. hangayorum* Vojnits, 1988 is a junior synonym of *E. lindti* Viidalepp, 1988.

Eupithecia nigrilinea (Warren, 1896)

Tephroclystia nigrilinea Warren, 1896, *Novit. zool.* **3**: 317.

Eupithecia ingrata Vojnits, 1981, *Annales hist.-nat. Mus. natn. hung.* **73**: 224, fig. 4. **Syn. n.**

Eupithecia ingrata talvei Viidalepp, 1988, *Fauna pyadenits gor Srednej Azii* [*Geometridae fauna of the Central Asian mountains*]: 121, pl. 2, fig. 18; text-pl. 26, figs 5–10.

This variable Himalayan species has a northern limit of distribution in the mountains of Uzbekistan, Kirghizstan and Tajikistan, where it is represented by subsp. *talvei* Viidalepp, 1988. However, similar small and dark specimens are also common in Kashmir and well to the South-East. The species is distributed right across the Himalayas and adjacent mountain areas from Uzbekistan in the north to northern Thailand in the south and Afghanistan in the west. Habitus and male genitalia illustrated in Inoue (2000).

Examined type material. ♀, Kasauli aug. 1893, *nigrilinea* Warr. Type ♀ (holotype, BMNH); ♀, W-Pakistan, Swat, N v. Kalam, Gabral-Tal, 2,100 m, 6–9. vii. 1969, leg. G. Ebert, Vojnits slide no 12092 (holotype of *E. ingrata*, SMNK); ♂, Tajik. SSR [Tajikistan], Ghissarsky Mts, southern slope, Khonaka river, Shamol, 7. vi. 1976, leg. Talve (holotype of *E. ingrata talvei*, IAET).

Recent material. 1 ♀, Indien, Lahoul, Koksar, ca 3,000 m, 16–17. vii. 1980, leg. W. Thomas (SMNS); 1 ♀, same locality, Rohtang-Paß, 3,000 m, 17–18. vii. 1980, leg. W. Thomas (SMNS); 1 ♀, Indien, Ladakh, Kharbu, 3,000 m, 6. vii. 1981, leg. W. Thomas (SMNS); 2 ♂, same locality, Umgeb. Stock, ca 4,200 m, 24 and 29. vii. 1981, leg. W. Thomas (SMNS); 3 ♂ 2 ♀, Indien, J & K, Ladakh, vic. Lotsun, ca 3,000 m, 25. vi. 1987 and 10. viii. 1988, leg. W. Thomas (ZFMK); 1 ♂ 2 ♀, same locality, Kharbu, 2,800 m, 12. vii. 1987, leg. W. Thomas (ZFMK); 1 ♀, same locality, Miru, 3,700 m, 23. vii. 1987, leg. W. Thomas (ZFMK); 1 ♂ 3 ♀, same locality, 15 km ö Drass, 3,000 m, 27. vii. 1987, leg. W. Thomas (ZFMK); 6 ♂ 8 ♀, Indien, J & K, Kashmir, Sonamarg, 2,700 m, 28. vii. 1987 and 13. viii. 1988, leg. W. Thomas (ZFMK); 2 ♂ 2 ♀, same locality, Gund, 2,200 m, 29. vii. 1987, leg. W. Thomas (ZFMK, ZISP); 4 ♂ 11 ♀, Indien, J & K, Ladakh, Khardung La, 4,100 m, 5. viii. 1988, leg. W. Thomas (ZFMK, ZISP); 3 ♀, same locality, 4,500 m, 7. viii. 1988, leg. W. Thomas (ZFMK); 1 ♀, India, Himachal Pradesh, Lahul, Chandru valley, n. Chatru, 3,350 m, 13–14. viii. 1991, leg. B. Nagy, coll. Dr P. Gyulai, Hungary (ZFMK); 2 ♂ 1 ♀, Pakistan, Hindukush Mts, 5 km E of Shandur pass, 3,500 m, 72°32'E, 36°10'N, 13. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 1 ♀, Pakistan, Himalaya Mts, Kaghan valley, Tathabaya, 73°26'E, 34°36'N, 2,200 m, 16. v. 1998, leg. Gy. M. László & G. Ronkay (TTM); 1 ♂ 1 ♀, same locality, 73°25'91"E, 34°35'33"N, 2,150 m, 9. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 1 ♂ 1 ♀, Pakistan, Himalaya Mts, Nanga Parbat area, Astor, Rama, 74°48'E, 35°21'N, 3,300 m, 13. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 2 ♀, Pakistan, Kashmir, Himalaya Mts, Deosai Mts, Bubin village, 74°59'E, 35°

12.6°N, 3,000 m, 16. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 6 ♂ 11 ♀, same locality, 3,150 m, 1–2. vii. 2000, leg. Z. Varga & G. Ronkay (ZFMK, ZISP); 3 ♀, same locality, 75°02'E, 35°13.5'N, 3,300 m, 3 and 6. vii. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 1 ♀, Nordindischer Himalaja, Himachal Pradesh, Lahaul, Bhaga-Tal, Umg. Keylong, 3,350 m, 18–21. vii. 1998, leg. de Freina (ZMKU); 1 ♂ 4 ♀, Pakistan, Karakoram Mts, Naltar valley, 74°09'22"E, 36°11'08"N, 2,900 m, 20. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 4 ♂ 5 ♀, same locality, 74°12'E, 36°09'N, 2,800 m, 22, 30. vi. and 8. vii. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 2 ♀, Pakistan, Kashmir, Himalaya Mts, 30 km N Murree, near Nathia Ghali, Ayubia vill., 2600 m, 10. vii. 2000, leg. Varga & Ronkay (ZFMK); 1 ♂, Pakistan, Deosai Mts, near Chilim, 3,500 m, 17. viii. 2004, leg. V. Gurko (coll. Ratzel); 5 ♂ 8 ♀, Pakistan-West, Great Himalaya Mts, near Gabar, 3,200 m, 21–24. viii. 2004, leg. V. Gurko, Ratzel slides nos 8305/3w, 5505/2w, 5505/3w, 17505/1m, 17505/2m; 2 ♂ 4 ♀, Pakistan, Azad Jammu & Kashmir, Thunian, 2,300–2,700 m, 25–30. viii. 2004, leg. V. Gurko, Ratzel slide no 3905/5w.

Remarks. The holotype specimen of *E. nigrilinea* (Warren, 1896) lacks both abdomen and antennae. Nevertheless, the species is externally distinct, and there is no doubt about its identity.

Eupithecia atrisignis Butler, 1889

Eupithecia atrisignis Butler, 1889, *Illust. typical Specimens Lepid. Heterocera Colln Br. Mus.* 7: 23, 114, pl. 137, fig. 10.

Eupithecia circumacta Prout, 1958, *Bull. Br. Mus. nat. Hist. (Ent.)* 6 (12): 391.

Eupithecia forsteri Vojnits, 1983, *Acta zool. Acad. Sci. hung.* 29: 266, figs 7, 9.

Eupithecia profana Vojnits, 1984, *Acta zool. Acad. Sci. hung.* 30: 220, figs 10, 13 (all synonymised in Galsworthy and Mironov, 2005).

Misidentification: *violacea* Inoue, 2000 (*nec* Vojnits, 1981).

This species, though evidently more abundant in the eastern Himalayas, is rare in modern material from the area. It ranges from the western Himalayas to southwest China. Habitus and male and female genitalia illustrated in Galsworthy and Mironov (2005).

Examined type material. ♂, Dharmasala 87-59, *Eupithecia atrisignis* Butler type, BM Geom. slide no 20314 (holotype, BMNH); ♀, Darjeeling, Aug. 1904, BM slide no 20150 (holotype of *Eupithecia circumacta*, BMNH); ♂, Nepal, Dudh Kosi Tal, 3,000 m, Vojnits slide no 11796 (holotype of *Eupithecia forsteri*, ZSM); Vojnits: ♀, China, Yunnan province, Lijiang, Vojnits slide no 13769, 11. vi. 1934, H. Höne (holotype of *Eupithecia profana*, ZFMK).

Older material. 2 ♂ 5 ♀, India U.P., Naini-Tal, 6,600 ft., respectively 28. vii, 3, 5, 6, 8, 10, and 20. viii. 1934, J. A. Graham, BM 1934-514, BM Geom. slides 21527 and 21785 (♂), and 21767 (♀) (BMNH).

Recent material. 1 ♀, Indien, U P, 15 km N Joshimath–Ghangaria, ca 3,050 m, 27–30. vii. (19)93, leg. Kautt & Weisz, Ratzel slide no GU24905/1w (SMNS).

Remarks. The synonymy of this species was dealt with extensively in Galsworthy & Mironov (2005).

Eupithecia exactata Staudinger, 1882 (Fig. 13)

Eupithecia exactata Staudinger, 1882, *Stettin. ent. Ztg* 43: 78.

Eupithecia opulenta Vojnits, 1982, *Acta zool. Acad. Sci. hung.* 28: 420, fig. 21 (synonymised in Mironov (1991)).

Eupithecia subolivacea Inoue, 1996, *Trans. lepid. Soc. Japan* **47**: 241, figs 7, 14. **Syn. n.**

This species was first recorded from Pakistan under the name of *E. subolivacea* Inoue, 1996. It is a Central Asian species distributed from northern Iran in the west to Mongolia in the east. Judging from the large series of this species in the collection of ZISP, *E. exactata* is a very common in the Pamir Mts.

Male and female genitalia. Illustrated in de Laever (1956).

Examined type material. 1 ♀, [Kazakhstan], Saisan, Origin, *ex coll.* Staudinger, *exactata* Stgr, det. E. Schütze, Kassel; 1 ♀, Saisan, Hohr, *Exactata* Stg ♀, Boh. Schakuh, *exactata* Stgr det. E. Schütze, Kassel (syntypes, MNHU); ♀, Turkestan Oriental Fort-Naryne Prov. Semirechensee, S. Akulin, 1910-1911, gen. 891 ♀ det. Vojnits A. (holotype, *E. opulenta*) (TTM); ♂, Pakistan, Gilgit, alt 1,600 m, 17. vii. 1990, F. Autolombard et J. Plante leg., Inoue slide 15824, BM Geometrid slide 19217 (holotype of *Eupithecia subolivacea*) (BMNH).

Recent material. 4 ♂ 6 ♀, Indien, J & K, Ladakh, Fatu-La, 3,700 m, 7-8 and 29. vii. 1981, leg. W. Thomas, Lep1997-14 (SMNS); 3 ♂ 2 ♀, same locality, Umgeb. Stock, 4,200 m, 24-29. vii. 1981 and 1-3. viii. 1980, leg. W. Thomas, Lep1997-14 (SMNS); 2 ♂ 1 ♀, same locality, vic. Lotsun, 3,000 m, 13. vii. 1987, leg. W. Thomas (ZFMK); 7 ♂ 27 ♀, same locality, Miru, 3,700 m, 23. vii. 1987, leg. W. Thomas (ZFMK, ZISP); 1 ♂ 3 ♀, same locality, Khardung La, 4,100 and 4,500 m, 5-7. viii. 1988, leg. W. Thomas (ZFMK); 1 ♀, same locality, vic. Kharbu, ca 2,800 m, 11. viii. 1988, leg. W. Thomas (ZFMK); 1 ♂ 1 ♀, Indien (56 and 49), Himachal Pradesh, Spiti, Spiti Valley, 1 km NW Kaza, 3,550 m, 5 and 11. viii. (19)94, leg. P. Kautt & V. Weisz (ZMKU); 1 ♀, Pakistan, Karakoram Mts, Naltar valley, 74°12'E, 36°09.6'N, 2,800 m, 8. vii. 2000, leg. Z. Varga & G. Ronkay (ZFMK).

Remarks. According to Staudinger's original description, the series consisted of two fresh females from Saisan, one of them lacking an abdomen, and "probably a rather worn male from the same place (which I therefore leave out of account)". In view of Staudinger's comment about the male, only the two females should be regarded as syntypes. The two specimens detailed above appear to be the original syntypes, and one of them indeed lacks an abdomen. They are certainly conspecific. We also found a male, which had been subsequently dissected by de Laever, which may have been the male referred to by Staudinger. It belongs to the same species.

***Eupithecia nephelata* Staudinger, 1897 (Fig. 14)**

Eupith(ecia) nephelata Staudinger, 1897, *Dt. ent. Z. Iris* **9**: 282.

This species has hitherto been recorded only from the mountains of Mongolia, Kirghizstan and Tajikistan. It is similar to *E. exactata*, but usually larger and paler (and considerably rarer) than this latter. The male and female genitalia of the two species are easily distinguished.

Recent material. 1 ♂ 1 ♀, Indien, J & K, Ladakh, vic. Lotsun, 3,000 m, 13. vii. 1987, leg. W. Thomas (ZFMK, ZISP); 16 ♀, same locality, Miru, 3,700 m, 23. vii. 1987, leg. W. Thomas; 1 ♀, same locality, Khardung La, 4,100 m, 5. viii. 1983, leg. W. Thomas (ZFMK, ZISP); 1 ♂ 2 ♀, N-Pakistan, 8 km N of Sost, 2,800 m, 36°74'N, 74°49'E, Nr. 17, 15. vi. 1992, leg. M. Hreblay & G. Csorba (TTM).

Remarks. We have not hitherto been able to locate type material for this species. De Laever (1956) published photographs of male and female genitalia preparations: in his pre-

amble he refers to the loan of a series of types from Dr Alberti in Berlin, but unfortunately the key to the illustrations gives only his own preparation numbers, so that it is not possible without the specimens to hand to identify definitively whether individual photographs are based on type material. We think it likely that they are, and in this case for the moment base our concept of *nephelata* on the male and female genitalia illustrated in figs 29 and 30 respectively of De Laever's paper, which match the series in ZFMK and ZISP.

***Eupithecia marginata* Staudinger, 1892 (Fig. 15)**

Eup(ithecia) marginata Staudinger, 1892, *Dt. ent. Z. Iris* 5: 257.

This species is known from Cyprus eastward to NW China. It has not previously been recorded from the area under study.

Male and female genitalia. Illustrated in de Laever (1956).

Examined type material. ♀, *marginata* ♀, Kuldja, Origin, De Laever slide no 145/4 (lectotype, here designated, coll. Staudinger, MNHU); 1 ♂, *marginata* Stgr., Origin, Kuldja, Rkbl. 84, De Laever slide no 145/3, 3 further undissected and unsexed specimens, same label details (paralectotypes, coll. Staudinger, MNHU).

Recent material. 1 ♀, Indien, J & K, Ladakh, Kharbu, 2,800 m, 12. vii. 1987, leg. W. Thomas (ZFMK); 2 ♂, Pakistan, Great West. Himalaya Mts, near Gabar, 3,200 m, 21–24. viii. 2004, leg. V. Gurko, Ratzel slides nos 17805/2m, 30805/2m (coll. Ratzel).

Remarks. This species was described by Staudinger on the basis of 6 specimens from the Kuldja area in modern Chinese Xinjiang collected by Rückbeil. The five syntypes we have examined belong to this series. The whereabouts of the sixth is unknown. We therefore designate the dissected female as lectotype, to ensure stability.

***Eupithecia exicterata* Mironov & Ratzel, *sp. n.* (Fig. 16)**

Diagnosis. Wingspan 21–25 mm; fore wing 10.5–12.5 mm. Fore wing elongate, costa slightly arched at base, termen oblique, evenly curved, apex rather pointed; ground colour brownish grey with oblique rusty medial area from base of wing to apex; transverse lines (basal, ante- and postmedial) narrow, rather inconspicuous, oblique and straight but angled near costa; costal margin usually darker, brownish grey, irrorated by ash-grey scales; terminal area with distinct, narrow, wavy whitish subterminal line; terminal line relatively broad, black or dark brown, shortly interrupted by vein endings; discal dot large, circular or ovoid, black or dark brown. Fringes chequered pale grey and brownish grey. Hind wing slightly elongate with angulate termen; ground colour dark, brownish grey but slightly lighter than fore wing; postmedial line distinct, evenly curved, darker near anal margin; terminal area darker, brownish, with distinct, narrow, dentate whitish subterminal line; discal dot small (smaller than on fore wing), usually rounded; terminal line and fringes as fore wing.

Male genitalia (Fig. 24). Uncus short and stout, sharply tapered and pointed to tip, biapical. Valve shaped like an orange segment, with slightly bowed dorsal margin, evenly curved and thickened ventral margin and very narrow, almost pointed apex; sacculus lightly sclerotized. Vinculum broad and short, semicircular. Papillae on the anterior arms of labides elongate, covered by short setae. Aedeagus stout, but shorter than length of valve. Vesica armed with one spiniform cornutus with very broad base, two heavily sclerotized, spindle-shaped dentate cornuti, one elongate, U-shaped cornutus and with one large folded, irregular cornutus near ductus ejaculatorius base. Sternite A8 large, elongate, broadened at base, with lateral

margins sinuate and sclerotized in posterior half, and with two sclerotized, asymmetrical (inclined to left), short and blunt, rounded apical arms; basal hollow deep; apical hollow shallow.

Female genitalia (Fig. 25). Bursa copulatrix large, ovate, sclerotized, almost completely covered with slim, pointed spines, the marginal spines on the ventral side longer than the others. Ductus bursae short and broad, heavily sclerotized around marginal spines of the spiniferous area on the ventral side, with a small separate patch of small spines at base of colliculum. Ductus seminalis very long, broad, curved along corpus bursae; broadly attached to ductus bursae near colliculum from ventral side. Colliculum collar-like, relatively small, short and narrow, inclined to left. Antrum membranous, densely covered by numerous pores. Tergite A8 large, broad, almost quadrate with convex anterior and lateral margins and with a slightly concave posterior margin and rounded posterior corners. Anterior and posterior apophyses long and thick, expanded and flattened at apices. Papillae anales large, sclerotized, elongate and narrow with pointed tips, densely covered by numerous short and stout, spiniform setae, which are directed toward the eighth tergite.

Similar species. This species belongs to the *semigraphata* group. It is similar to *Eupithecia icterata* f. *subfulvata* (Haworth, 1809), but can be distinguished from this latter by the more elongate fore wing with narrower rusty medial area, by the less curved transverse lines and the narrower, finer whitish subterminal line on the fore wing. The male genitalia of *E. exicterata* are very clearly distinguished from those of *E. icterata* by the stouter uncus, the shorter and broader valve with less narrow apex, the shorter vinculum, the shape of the eighth sternite and by the presence of a spiniform cornutus with very broad base and only two dentate cornuti on the vesica (in *E. icterata* there are three). The female genitalia of *E. exicterata* are also clearly distinguished from those of *E. icterata* by the presence of a large spineless area in the posterior half of the corpus bursae, the longer and thicker apophyses which are expanded and flattened at their apices and also the larger, heavily sclerotized, pointed papillae anales.

Holotype. ♂, Pakistan, Hindukush Mts., 5 km E of Shandur pass, 72°38'E, 36°07'N, 3,250 m, 24–25. vi. 2000, leg. Z. Varga & G. Ronkay (ZFMK). Paratypes. 3 ♂, same locality (ZFMK, ZISP); 2 ♀, Indien, J & K, Kashmir, vic. Sonamarg, 2,900 m, 13. viii. 1988, leg. W. Thomas (ZFMK, ZISP); 1 ♀, Pakistan, Karakoram Mts, Naltar valley, 74°09'22"E, 36°11'8"N, 2,900 m, 20. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 1 ♂ 1 ♀, Pakistan, 2,800 m, 74°12'E, 36°09.6'N, respectively 18. vii. 1998, leg. G. Csorba & L. Ronkay, slide ACG GL37 and 14. 08. 1998, leg. Z. Varga & G. Ronkay, slide ACG GL16 (coll. László); 3 ♂ 3 ♀, Pakistan-West, Great Himalaya Mts, near Gabar, 3,200 m, 21–24. viii. 2004, leg. V. Gurko, Ratzel slides nos GU8705/1w, GU8705/2m, GU8705/3w (coll. Ratzel); 1 ♀, Indien Uttar Pradesh, Gangotri, ca 3,000 m, 6–9. viii. (19)93, Kautt & Weisz, Ratzel slide no GU12905/1 (SMNS).

Remarks. In the collection of SMNK there are a series of Vojnits slides, belonging to this species: 2 ♂, nos 15980, 15988 and 5 ♀, nos 15979, 15981, 15982, 15989, 15990. The specimens themselves have not so far been found.

Eupithecia infecunda Vojnits, 1981

Eupithecia infecunda Vojnits, 1981, *Annales hist.-nat. Mus. natn. hung.* **73**: 225, fig. 5.

Vojnits published this species on the basis of a single female. We have examined the holotype specimen: externally it looks more like a member of the genus *Gymnoscelis* than of *Eupithecia*. The genitalia could fit in either genus, and we have not been able to reach a

definite conclusion on its status.

Examined type material. ♀, W-Pakistan, Swat, Kalam, 2,000 m, 9. vii. 1969, leg. G. Ebert, Vojnits slide no 12091 (holotype, SMNK).

Taxonomic changes introduced in the three parts of this paper

New species and subspecies

Eupithecia alexiae Galsworthy & Mironov
Eupithecia bestia Mironov & Galsworthy
Eupithecia brunneomarginata Mironov & Galsworthy
Eupithecia dalhousiensis Mironov & Galsworthy
Eupithecia efferata Mironov & Ratzel
Eupithecia egregiata Mironov & Ratzel
Eupithecia exicterata Mironov & Ratzel
Eupithecia firmata Mironov & Ratzel
Eupithecia karli Ratzel & Mironov
Eupithecia pannosa Mironov & Galsworthy
Eupithecia phaea Mironov & Galsworthy
Eupithecia pusillata kashmirica Mironov & Ratzel
Eupithecia thomasi Mironov & Galsworthy
Eupithecia vetula Mironov & Ratzel
Eupithecia vinibua Mironov & Galsworthy

New synonymy

Eupithecia abundeli Vojnits, 1988, of *Eupithecia nepalata* Schütze, 1961
Eupithecia abiecta Vojnits, 1980, of *Eupithecia quadripunctata* Warren, 1888
Eupithecia acseszteri Vojnits, 1988, of *Eupithecia albispumata* Warren, 1893
Eupithecia acuta Vojnits, 1983, of *Eupithecia invicta* Vojnits, 1981
Eupithecia apparticeps Inoue, 2000, of *Eupithecia rajata* Guenée, 1858
Eupithecia aspectabilis Inoue, 1996, of *Eupithecia mesodeicta* Prout, 1938
Eupithecia beneficiaria Vojnits, 1988, of *Eupithecia propagata* Prout, 1926
Eupithecia commiserenda Vojnits, 1983, of *Eupithecia impavida* Vojnits, 1979
Eupithecia comparanda Vojnits, 1981, of *Eupithecia venosata* Fabricius, 1787
Eupithecia emikoe Inoue, 1996, of *Eupithecia mustangata* Schütze, 1961
Eupithecia hangayorum Vojnits, 1988, of *Eupithecia lindti* Viidalepp, 1988
Eupithecia hypognampta Prout, 1938, of *Eupithecia fletcheri* Prout, 1926
Eupithecia ingrata Vojnits, 1981, of *Eupithecia nigrilinea* Warren, 1896
Eupithecia iracunda Vojnits, 1988, of *Eupithecia propagata* Prout, 1926
Eupithecia jaani Mironov, 1989, of *Eupithecia thermosaria* Hampson, 1903
Eupithecia lineosa gulmargensis Prout, 1938, of *Eupithecia lineosa* Moore, 1888
Eupithecia manca Vojnits, 1979, of *Eupithecia hannemanni* Vojnits & de Laever, 1973
Eupithecia mystica Vojnits, 1988 (*nec* Dietze, 1910), of *Eupithecia emittens* Inoue, 1996
Eupithecia nova Vojnits, 1974, of *Eupithecia ochracea* Warren, 1888
Eupithecia pacifica Inoue, 1980, of *Eupithecia consortaria* Leech, 1897
Eupithecia pamiri Vojnits, 1988, of *Eupithecia relaxata* Dietze, 1904
Eupithecia pengata Schütze, 1961, of *Eupithecia albispumata* Warren, 1893
Eupithecia petrensis Mironov, 1989, of *Eupithecia nepalata* Schütze, 1961
Eupithecia propoxydata Schütze, 1961, of *Eupithecia incurvaria* Hampson, 1903
Eupithecia segura Vojnits 1979, of *Eupithecia impavida* Vojnits, 1979

Eupithecia subolivacea Inoue, 1996, of *Eupithecia exactata* Staudinger, 1882
Eupithecia tabidaria Inoue, 1955, of *Eupithecia subtacincta* Hampson, 1895
Eupithecia tonu Viidalepp, 1988, of *Eupithecia subtilis* Dietze, 1910
Eupithecia tricornuta Inoue, 1980, of *Eupithecia quadripunctata* Warren, 1888
Eupithecia uniformis Inoue, 2000, of *Eupithecia fulvipennis* Butler, 1889
Eupithecia wolff Vojnits, 1985, of *Eupithecia vivida* Vojnits & de Laever, 1978

Changes of status

Eupithecia albicans Vojnits, 1981, revived as a bona species
Eupithecia costisignata Dietze, 1904, returned to its earlier status as a synonym of
Eupithecia relaxata Dietze 1904
Eupithecia mesodeicta Prout, 1938, elevated to species
Eupithecia particeps Vojnits, 1988, revived as a bona species
Eupithecia vivida Vojnits & de Laever, 1978, revived as a bona species

References

- Dietze, K., 1904. Beiträge zur Kenntnis der Eupitheciiden. *Dt. ent. Z., Iris* [1903] **16**: 331–387.
 ———, 1906. Beiträge zur Kenntnis der Eupitheciiden. *Dt. ent. Z., Iris* **19**: 55–67, pl. 1.
 ———, 1908. Beiträge zur Kenntnis der Eupitheciiden. *Dt. ent. Z., Iris* **21**: 153–201, pls 2–3.
 ———, 1910. *Biologie der Eupitheciiden*. I. 82 pls. Berlin.
 ———, 1913. *Biologie der Eupitheciiden*. II. 173 pp., 86 pls. Berlin.
 Galsworthy, A. & V. Mironov, 2005. *Eupithecia atrisignis* Butler, 1889 (Lepidoptera, Geometridae), its relatives, and related problems. *Trans. lepid. Soc. Japan* **56**: 223–236.
 Inoue, H., 2000. *Eupithecia* Curtis (Geometridae, Larentiinae) from Nepal. In Haruta, T. (Ed.), *Moths of Nepal*, part 6. *Tinea* **16** (Suppl. 1): 27–44.
 Laever, de E., 1956. Études sur le Genre *Eupithecia* Curtis. *Bonn. zool. Beitr.* **7**: 237–247.
 Mironov, V. G., 1990. A systematic catalogue of geometrid moths of the tribe *Eupitheciini* (Lepidoptera, Geometridae) of the fauna of the USSR, Part I. *Ent. Obozr.* **69**: 656–670 (in Russian).
 ———, 1991. A systematic catalogue of geometrid moths of the tribe *Eupitheciini* (Lepidoptera, Geometridae) of the fauna of the USSR, Part II. *Ent. Obozr.* **70**: 157–167 (in Russian).
 ———, 2003. Larentiinae II (Perizomini and Eupitheciini). In Hausmann, A. (Ed.), *The geometrid Moths of Europe* **4**: 1–463.
 Mironov, V. G. & A. C. Galsworthy, 2007. The genus *Eupithecia* (Lepidoptera, Geometridae) in Taiwan: an updated survey. *Trans. lepid. Soc. Japan* **58**: 341–363.
 Mironov, V. G., Galsworthy, A. C. & U. Ratzel, 2008a. A survey of the *Eupithecia* fauna (Lepidoptera, Geometridae) of the Western Himalayas: Part I. *Trans. lepid. Soc. Japan* **59**: 55–77.
 ———, 2008b. A survey of the *Eupithecia* fauna (Lepidoptera, Geometridae) of the Western Himalayas: Part II. *Trans. lepid. Soc. Japan* **59**: 117–143.
 Petersen, W., 1910. Ein Beitrag zur Kenntnis der *Eupithecia* Curt. *Dt. ent. Z., Iris* [1909] **22**: 203–314, 28 tafn.
 Prout, L. B., 1938. Brephinae, Oenochrominae, Geometrinae, Sterrhinae, Larentiinae. In Seitz, A. (Ed.), *The Macrolepidoptera of the World* **4** (Suppl.). 766 pp., 18 pls. Stuttgart.
 Scoble M. J. (Ed.), 1999. *Geometrid Moths of the World: a Catalogue* (Lepidoptera, Geometridae). xxv, 1,016 pp. (2 volumes). CSIRO Publishing, Collingwood.
 Viidalepp, J., 1988. *The Fauna of geometrid Moths of the Mountains of Central Asia*. 240 pp. Publ. “Nauka”, Moscow. (In Russian).
 Vojnits, A. M., 1982. A revision of the “*Eupithecia innotata* group”, I. (Lepidoptera, Geometridae). *Annales hist.-nat. Mus. natn hung.* **74**: 217–239.
 ———, 1988. New *Eupithecia* species from Soviet Central Asia (Lepidoptera, Geometridae). *Annales hist.-nat. Mus. natn hung.* **80**: 79–90.

摘 要

西部ヒマラヤのカバナミシャク属 III (V. MIRONOV · A. C. GALSWORTHY · U. RATZEL)

ヒマラヤ西部のカバナミシャク属 (*Eupithecia*) の再検討の第3報で, 本報をもってこのシリーズを完了する. 本報では新たに4新種 (*E. efferata* Mironov & Ratzel, *E. egregiata* Mironov & Ratzel, *E. brunneo-marginata* Mironov & Galsworthy, *E. exicterata* Mironov & Ratzel) を含む26種を扱い, 約10個のシノニムも整理した. また, これまでに本シリーズで記載した新種, 新亜種のほか, 学名の変更およびシノニムの一覧を末尾に添えた.

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